ADL110

User Manual

Version 0.94

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1 Version History

Version 0.9 published 10.12.2012
Version 0.91 published 22.01.2013
Version 0.92 published 29.01.2013
Version 0.93 published 08.02.2013
Version 0.94 published 12.02.2013

2 Page Index

This manual contains numbered pages 1 to 33.

3 General Description

The ADL110 is a flight data link device. It allows downloading weather data while in flight. Besides it features in flight SMS communication. The data link works through the Iridium satellite network with global coverage.

4 Certification ADL110

The ADL110 can be installed in certified aircraft if a suitable minor change is used. The device itself does not come with any certification. Please consult the minor change documentation for details.

5 Disclaimer

The ADL110 is provided as a non certified component. The only basis on witch it can be installed is an appropriate minor change. It is the sole responsibility of the user and installer that is installed and used in a legal way. The device may stop working at any time. Do not undertake flights you would not undertake without the ADL110.

6 Warning!

While we do everything we can to ensure quality the ADL110 devices might not work at any time. In addition they may display false information. **Never penetrate weather based on the information provided by the ADL110**. This information is for situational awareness only. The device features a GPS moving map system. This system is designed to display the aircraft position in relation to the weather data. It is not designed as a means of primary navigation. Especially the build in database is not updated in a regular aviation cycle. It is also not maintained to the standards of certified aviation databases.

7 Emergency procedures

If you suspect any malfunction of the ADL110 or interference with other aircraft systems, deactivate the device by pulling / deactivating the aircraft circuit breaker for the device. Do not reactivate the device until the problem has been investigated and resolved on the ground.

In case of a generator failure or similar situation requiring electric load shedding, deactivate the ADL110 by pulling / deactivating the aircraft circuit breaker for the device.

8 General Usage

The ADL110 is operated through a touch screen. There are no other user controls besides this touch screen.

The ADL110 does not feature an on/off switch. The device is switched on and off using the radio master switch of the aircraft. After electrical power is delivered to the device it will show the boot screen. At the bottom of the screen you will see boot messages. After booting the map page will be displayed and the device is ready for operation.
The duration of the boot process depends on how long the device has been switched off and on ambient temperatures. Below 0°C the first boot of the day may also take longer. In best case conditions when performing a “hot restart” the boot process can be accomplished in approximately 5 seconds. In a worst case scenario if components must be initialized in very low temperatures, the boot process can take up to 60 seconds

Figure 1 ADL110 Boot screen

Once booted the main navigation of ADL110 is found on the bottom of the screen. The selected page of the user interface will be highlighted in blue.

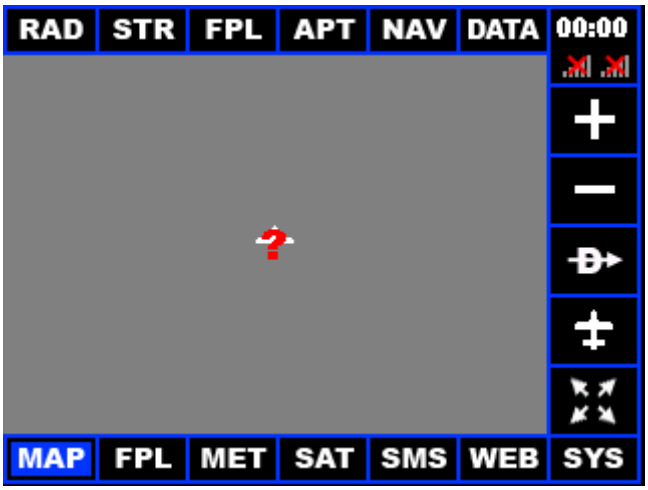

Figure 2 Empty MAP page showing the bottom navigation

9 Permanent Status Information

On the right top of the screen you will permanently see status information. This includes the current time in UTC as provided by the GPS receiver. Below you will see two signal quality indicators. The left symbol related to the Iridium satellite signal quality. You will need at least two bars in order to transmit data. On the right side you see the GPS quality bars. At least 1 bar will be required in order to get a GPS position fix. If no GPS position is available the last aircraft position will be shown on the map overlaid with a red question mark.

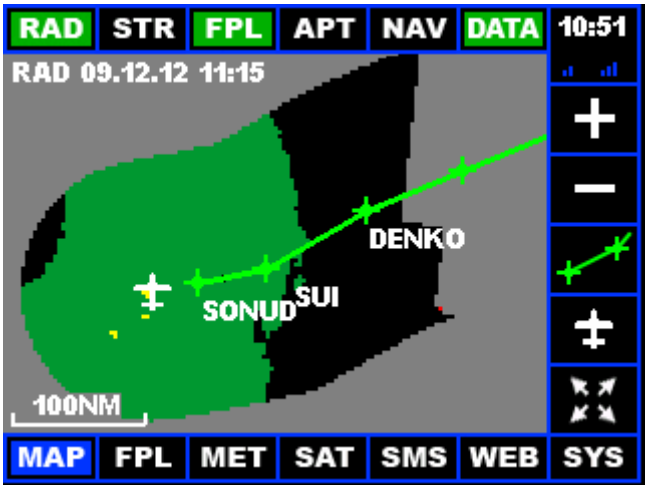

Figure 3 Time: 10:51 UTC, two bars Iridium reception, three bars GPS reception

10 MAP: Moving Map with Weather Overlay

The MAP page shows a moving map. The current aircraft position is displayed using a white airplane symbol. The symbol will be turned according to the current true ground track. Please not if any side wind component exists, this will not be the heading of your aircraft. Thus in strong winds weather you see in front of your aircraft may not be in front of your aircraft symbol on the moving map and vice versa.
The map is displayed using a mercator projection. Therefore true north will always be at the top of the screen but surface representation may be distorted compared to the

real dimensions on the globe. Please note the ADL110 has not yet been tested for operations near the true earth poles.

10.1 Using the map

By default the map will be centered at the current aircraft position. If you wish you can pan the map by touching the borders and corners of the map. The map will then pan in this direction.

If the “DATA” Overlay is activated (see below) a scale in nautical miles will be indicated at the bottom left corner of the map

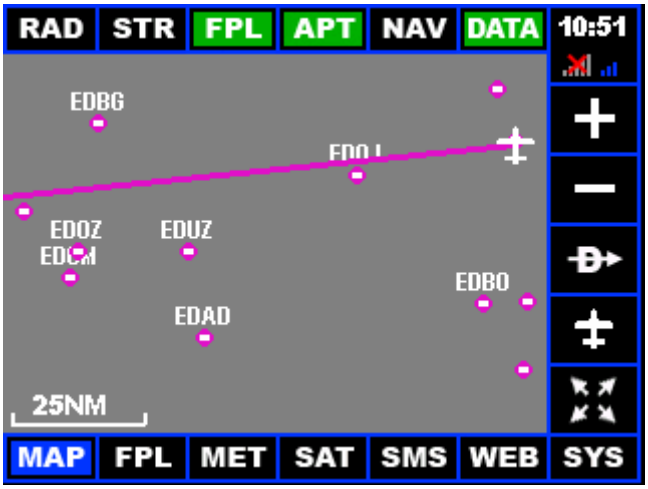

Figure 4 Using the map

10.2 Zoom the map

You can zoom in and out of the map using the plus und minus buttons on the right side.

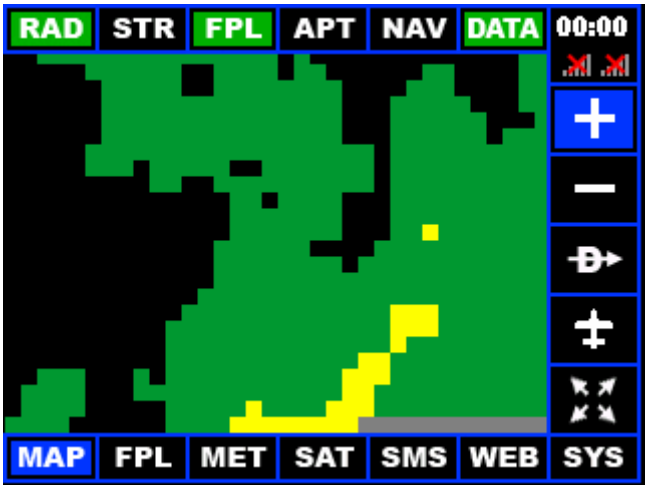

Figure 5 Zooming into the map using the plus button

10.3 Direct To

When you operate in manual flight plan mode, which means that the flight plan is not loaded automatically from an external device, you can use the “Direct To” shortcut in

order to enter a direct flight plan to a destination. For further flight plan details please refer to the “FPL” section below.

10.4 Center on Airplane

This button recenters the map at the current airplane position if the map bad been panned manually before.

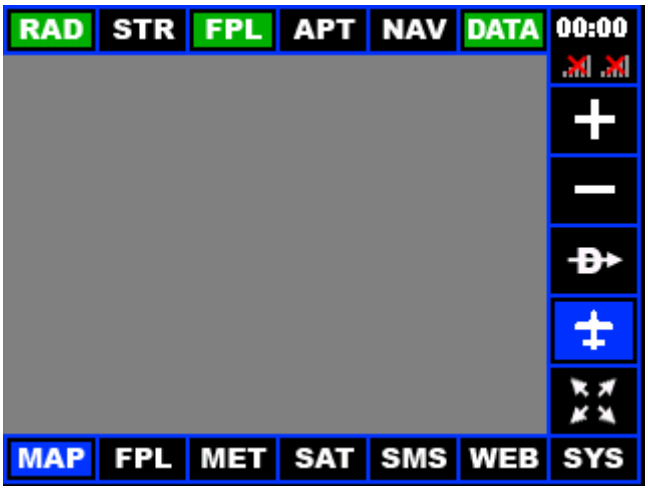

Figure 6 Recentering the panned map using the airplane symbol

10.5 Enlage map / Hide Navigation

Using this button you can enlarge the map area by hiding the top and bottom navigation controls. In order to show the controls again you have to press this button again.

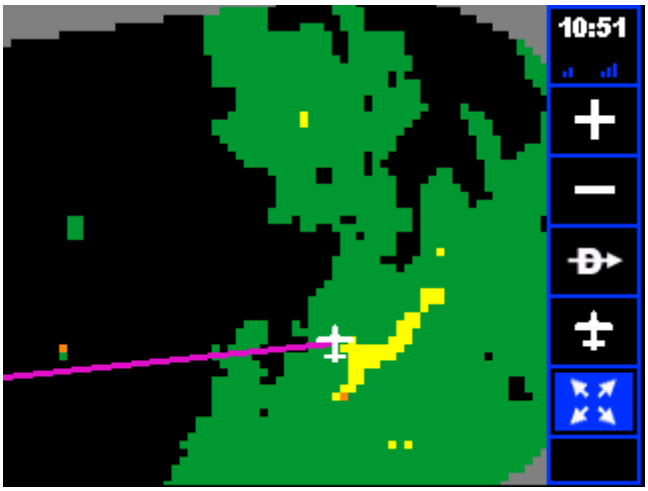

Figure 7 Enlarged map

10.6 Map Overlay options

On the top of the screen you see the sub navigation for the different map overlays. You can select the following overlays. If an overlay is selected the corresponding button will turn green.

10.6.1 RAD: Weather Radar Overlay

This overlay shows the currently loaded weather radar image. For instructions on how to load new data please refer to the SAT section.

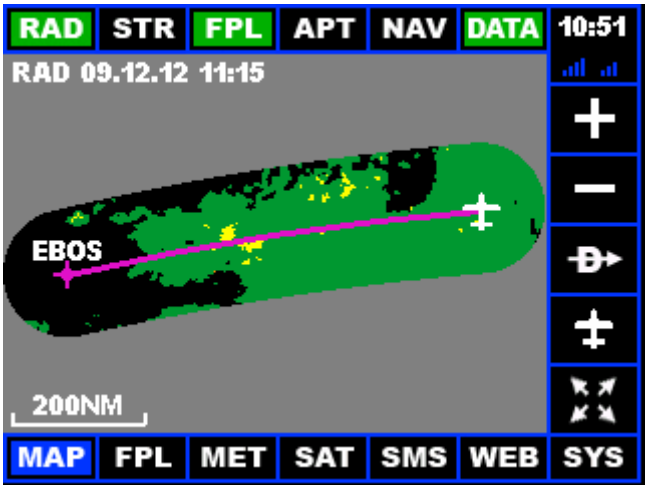

Figure 8 Sample weather radar overlay

The weather is always downloaded for the current route. The software will offer you a radar image around your programmed route as long as it lies within the coverage area. Please refer to the following site for an overview of the radar coverage by Deutscher Wetterdienst (DWD):

http://www.flugwetter.de/bilder/rad/index.htm?type=eu (Log-in required)

Depending on data compression the shape of the available radar patch around a route can vary. Black color mean that the area is part of the radar map patch and no echos are resent. Light gray indicates that no data is currently loaded for this location.
In the left top corner of the map you can see (option “DATA” being selected) the timestamp of the radar image. Currently the european radar images are produced with a timestamp at the hour and at 15, 30 and 45 minutes. Please not that DWD takes approximately 5min 30s to make the final image available. Thus, new radar data is available for download at 06, 21, 36 and 51 minutes each hour. Radar data is displayed using six colors including black as shown on the scale below.

Figure 9 Ascending radar color scale

Warning: Weather radar is for situational awareness only. The moving map system can produce unnoticed errors or the radar image provided by DWD could contain errors. Even if no fault exists the radar information will always be several minutes old. Therefore this system is not suitable for weather penetration.

10.6.2 STR: Strike Overlay

The strike overlay displays the available strike / lightning map. This function automatically deactivates the weather radar overlay and vice versa. Please note that the strike information provided by Deutscher Wetterdienst (DWD) differs in its coverage from the radar data. Please consult the following map in order to see the coverage:

http://www.flugwetter.de/bilder/blitzkarte_bild.htm (Log-in required)

Contrary to radar data strike data is constantly updated. When a new strike map patch is loaded the strike information of 8 minutes starting 10minutes before the request will be considered.
On the displays black color indicates that this area is part of the loaded strike map patch. Light gray indicates areas which are not included. Strike events are indicated by yellow crosses. Please note that the cross will be centered in a map pixel containing strikes. If multiple strikes have been measured by DWD in the raw data for this area only one yellow cross will appear on the strike map.

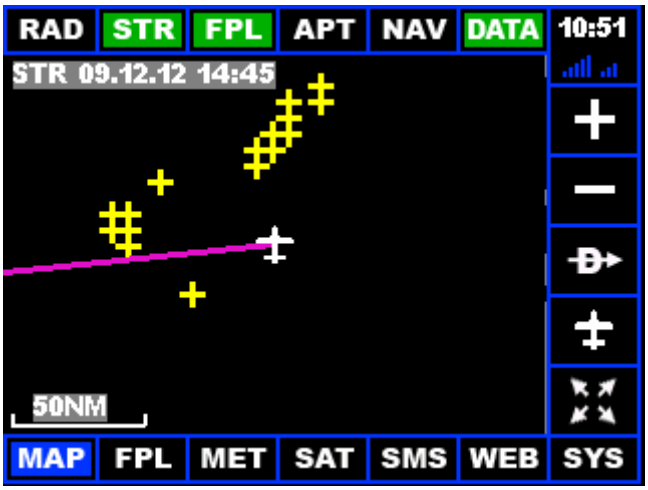

Figure 10 Sample strike overlay

Warning: Strike information is for situational awareness only. The moving map system could produce unnoticed errors or the strike image provided by DWD could contain errors. Therefore this system is not suitable for weather penetration.

10.6.3 FPL: Flightplan Overlay

This function allows to overlay the currently active flightplan over the map. The active leg is drawn in magenta. The rest of the route is drawn in white color.

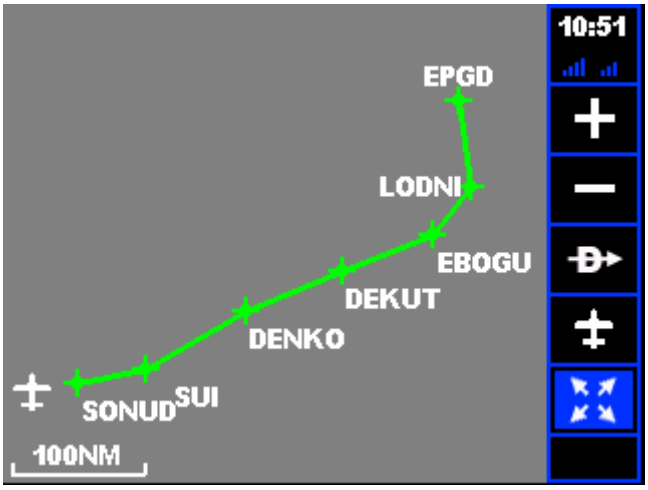

Figure 11 Sample flightplan overlay

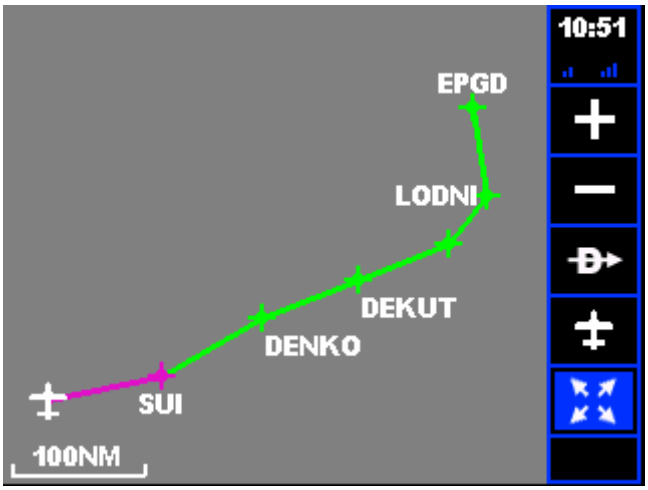

Figure 12 Sample flightplan with active waypoint SUI

10.6.4 APT: Airports

Displays or hides the database airports. Depending on the zoom level of the map only major airports or in some cases no airports at all will be shown.

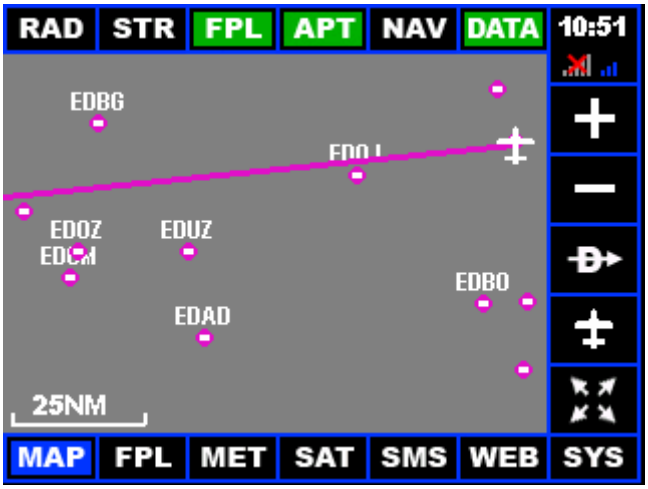

Figure 13 Sample view with airport overlay

Warning: The incorporated airport database is for situation awareness only. The database is not compiled and updated following aviation standards.

10.6.5 NAV: Navigational aids

Displays or hides the database navigational aids (VOR, NDB). Depending on the zoom level of the map no navaids will be shown.

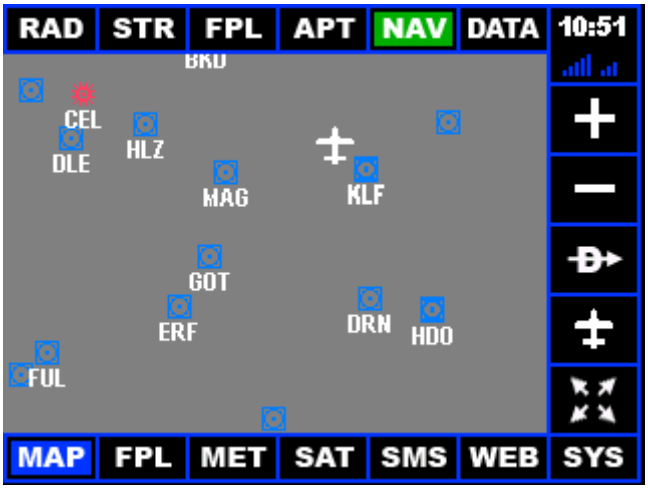

Figure 14 Navaid screen showing several VOR and one NDB

Warning: The incorporated navaid database is for situation awareness only. The database is not compiled and updated following aviation standards.

10.6.6 DATA: Data fields

Activates and deactivates the data fields and annotations on the map screen.

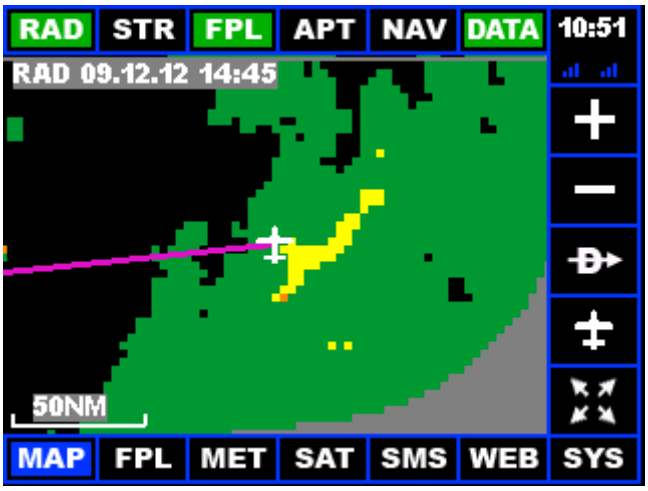

Figure 15 Sample screen with DATA annotations

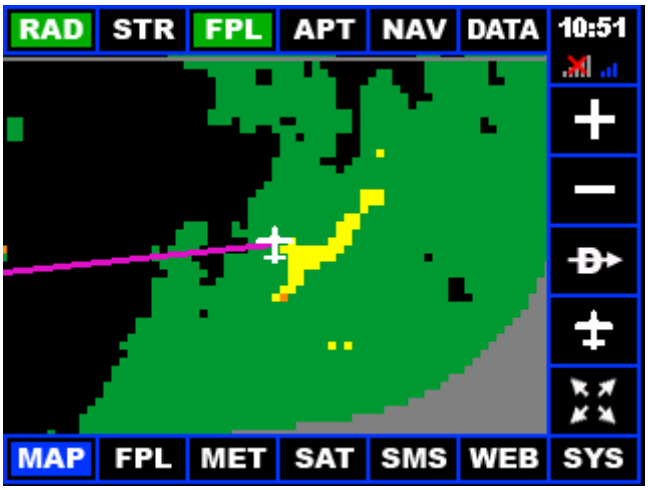

Figure 16 Sample screen without DATA annotations

11 FPL : Flightplan / Route

The FPL page will display the current route. We have to distinguish two totally separate operating modes. First the automatic flightplan mode (FPL IN activated) and the manual flightplan mode FPL IN deactivated.

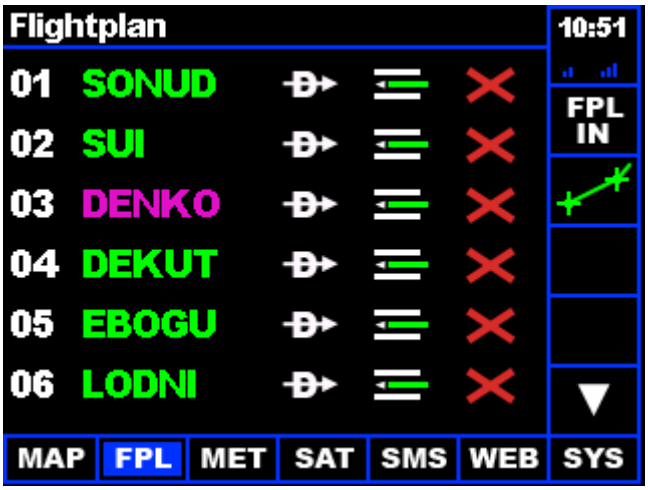

Figure 17 Manual flightplan with waypoint DENKO activated

11.1 Automatic FPL / Serial Aviation In

The automatic flightplan mode is selected by pressing the “FPL IN” button on the right side. In this mode the current flight plan is received through the serial port from another FMS/GPS System. The ADL110 will only display this flight plan. Any changes must be made in the primary system. If available this is the preferred mode because the database in the primary GPS will probably contain more data and no work is required entering the route multiple times into different devices.

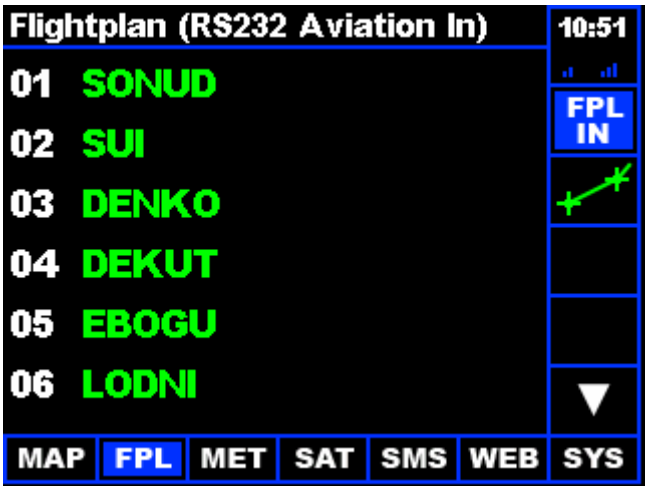

Figure 18 Automatic flight plan (FPL IN)

11.2 Manual FPL

If no automatic flight plan mode is activated the flight plan is entered manually by the user as follows-

11.2.1 Adding a new waypoint

Touch the green dashes (placeholder) at the end of the flightplan in order to add a new waypoint.

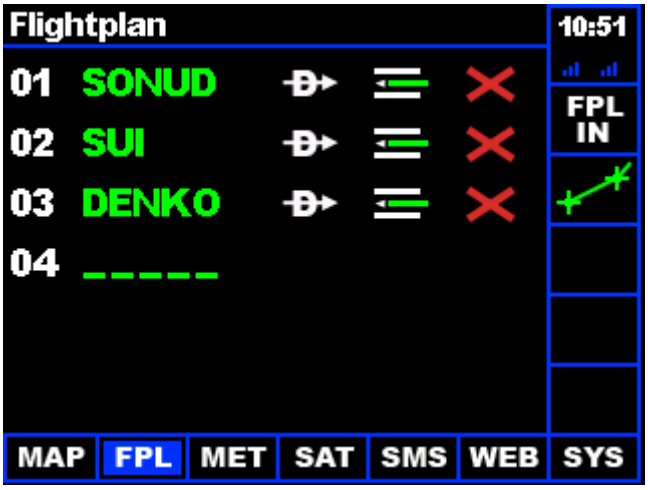

Figure 19 Flightplan edit interface

11.2.2 Modifying a waypoint

Touch the name of the waypoint and change its name.

11.2.3 Activating a waypoint

Use the “Direct To” button next to the waypoint name in order to navigate directly to this waypoint.

11.2.4 Inserting a waypoint

The Insert Waypoint button allows to insert a waypoint into the current flightplan.

11.2.5 Delete a waypoint

Use the delete waypoint function in order to delete a waypoint from the flightplan.

11.3 Center Map on Flightplan

The center map on flightplan button on the right side will switch to the map page and center the map von the current flight plan to give the best possible overview of the whole route.

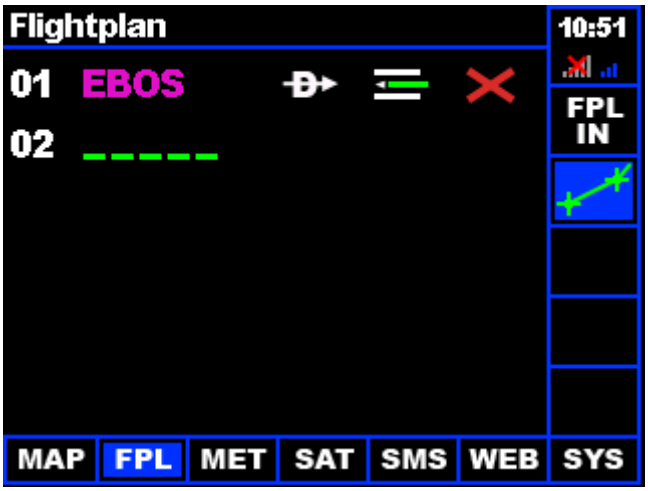

Figure 20 The center on flightplan button on the FPL page

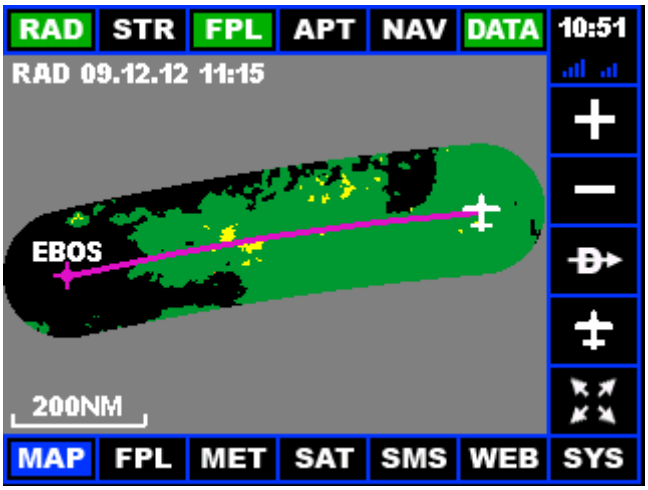

Figure 21 Map centered on the flightplan for better overview

12 MET: METAR / TAF

The met page displays the currently available METAR/TAF reports. If reports are available the list of corresponding airports will be displayed. By touching the airport name you get to the detail page where you can read METAR and/or TAF.
Use the arrow on the right side in order to get back to the overview. For information on how to download METAR/TAF please refer to the “SAT” section below.

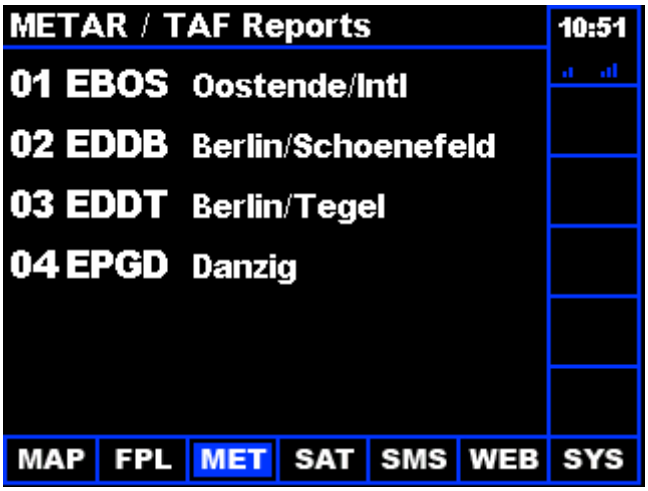

Figure 22 METAR/TAF overview

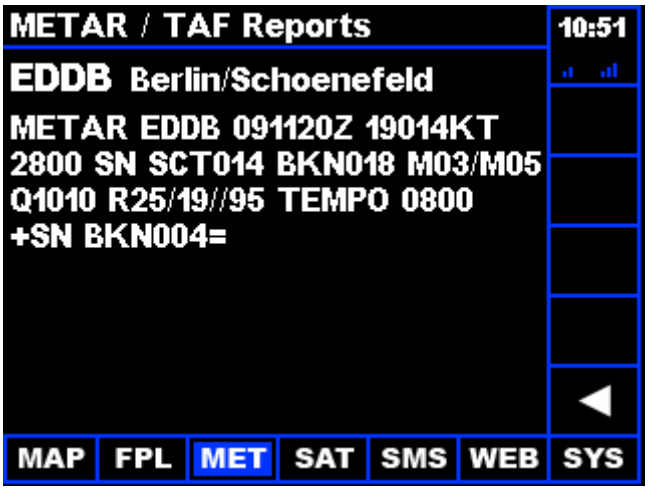

Figure 23 METAR/TAF details (in this case METAR only downloaded)

13 SAT: Satellite downloads

This page allows you to download weather data using the Iridium satellite network. For these functions to work properly you must have signed up for the Iridium data service and configured your DWD passwords. Concerning data service activation please contact us and concerning password configuration please refer to the section SYS below. Before starting a satellite download you have to specify which data to load.

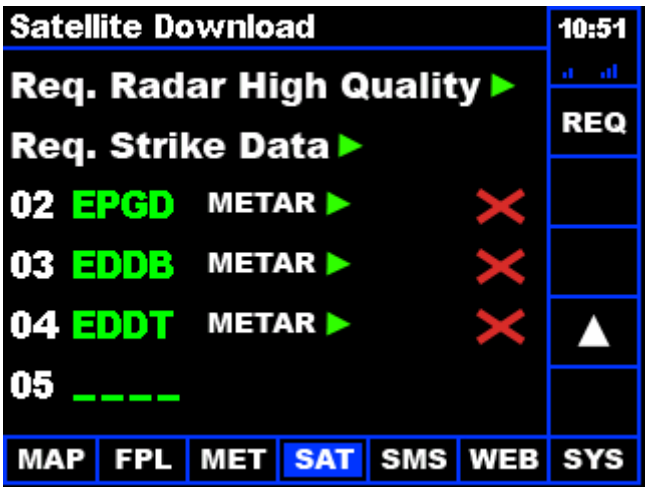

Figure 24 Configuring the weather download

Concerning weather radar you can select between:

No Radar Requested:	No radar download
Req. FPL Radar Low Q.:	Download radar image along current flight plan in low quality
Req. FPL Radar High Q.:	Download radar image along current flight plan in high quality
Req. Radar Destination:	Download radar image around the destination (last entry in flight plan) in low quality.
Req. Radar Current Pos. :	Download radar image around current GPS position in high quality.

The high and low quality settings differ in the resolution of the downloaded radar image. In general we recommend loading the smaller more cost efficient low quality image when you just want to get a rough overview of your route. For any more detailed analysis the high quality can be requested.
Please keep in mind that new radar data will be available at 06, 21, 36 and 51 minutes each hour. When loading data for a flight plan the data is always downloaded for the active segment and any subsequent segments of the flight plan. Familiarize yourself with the weather radar coverage area by Deutscher Wetterdienst (see section RAD: Weather Radar Overlay above). It will not do any harm but in general it does not make sense to request radar when flying way outside the coverage area.

Strike information can be requested by toggling the states “No Strike Requested” and “Request Strike Data” using the green arrow on the right or by touching the text itself. Similar to the weather radar please familiarize yourself with the coverage area of the strike data by Deutscher Wetterdienst (see section STR: Strike Overlay above).

Below you can enter up to 8 ICAO codes for which you would like to receive weather reports. Right of the ICAO code you can specify if you want to download METAR, TAF or both. Using the delete button ICAO codes can be deleted from the list.

In order to actually download the data use the request “REQ” button on the right side. After you do so a log windows will open indicating the progress of your download. Please note that a minimum of two signal quality bars for the Iridium network are necessary in order to download data. You can nevertheless start the download whenever you like. The software will then wait a short period until the required satellite reception is detected. After pressing “REQ” you will see the satellite log screen informing you of the transmission progress.

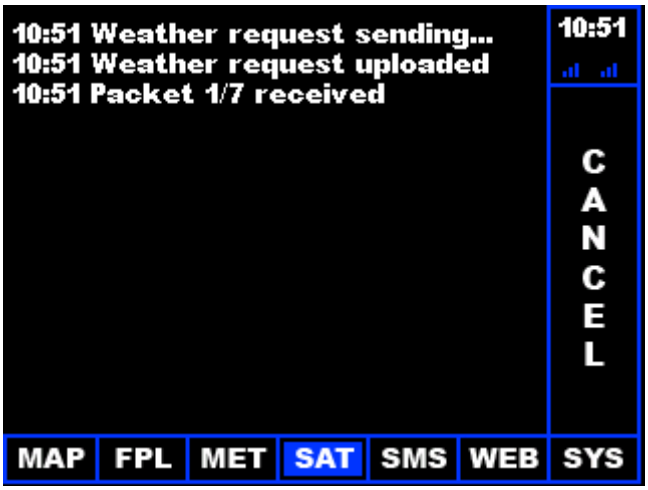

Figure 25 Transmission log screen

You can abort the transmission at any time using the cancel button. Please note that before the data request message is uploaded to the satellite the transmission will be cancelled totally. Once the message is uploaded you can still cancel but the data packets will be transmitted to the satellite and data usage will be charged. These messages will appear on the transmission screen with the info message “Info: Packet with illegal is”

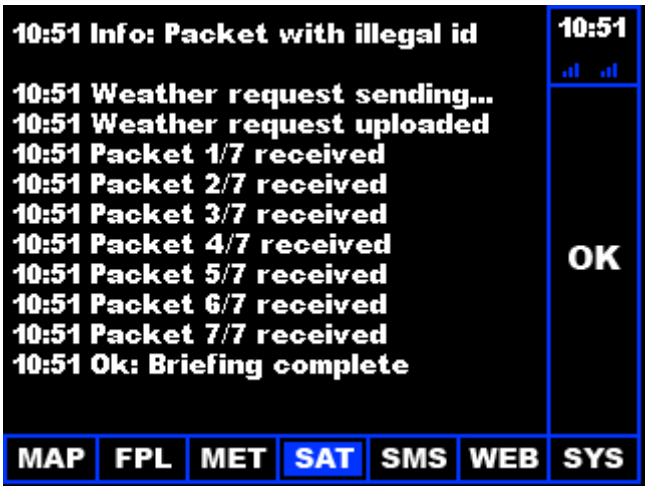

Figure 26 Transmission log screen

The satellite transmission works in data packets. First a request package is send to our proxy server. The data is downloaded using your credentials from the DWD servers and finally the data is split into multiple packets for the transmission to the ADL110. Finally the ADL110 will receive the individual packets until the request weather download is completed. The log will indicate the receipt of the individual packets. In general you can expect a total duration of 30s to 1 minute for the download depending on conditions.
When the download is finished the Cancel Button on the right transforms into an Ok button. Pressing this button brings the SAT page back to its initial stage and directs you to the MAP or MET page depending on your weather download.

The actual transmission costs will depend on your individual data contract.

14 SMS: Sending and receiving SMS

14.1 SMS / Inbox

When initially opening the SMS page you will be on the SMS / Inbox subpage. Here all incoming messages are shown. Unread messages in yellow, read messages are displayed in white color. Touch any message in order to get to the detail subpage. While unread messages exist the SMS symbol in the bottom navigation will be highlighted by a yellow frame.

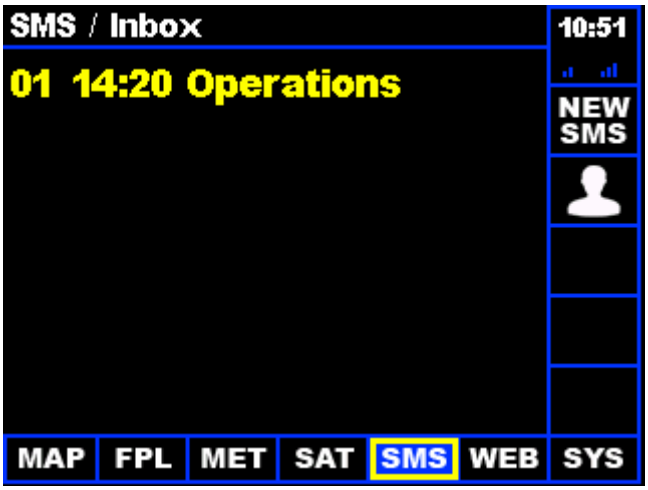

Figure 27 SMS inbox with one unread message

14.2 SMS / Details

The detail subpage allows you to read the SMS message. The buttons on the right allows to answer this message or to delete it. In order to go back to the overview please use the left arrow on the right side of the screen.

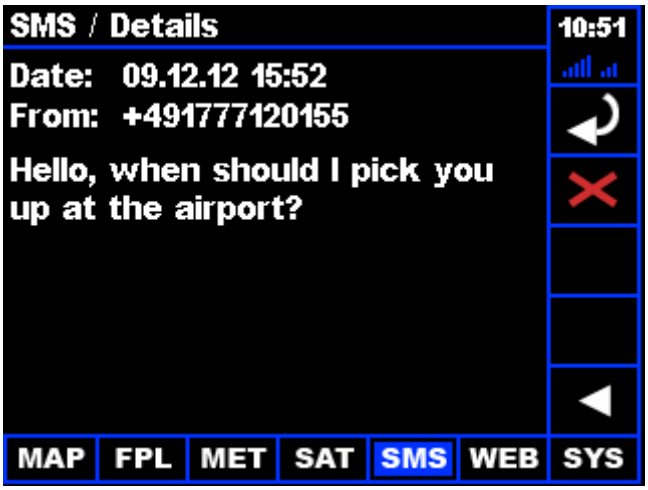

Figure 28 SMS details

14.3 SMS / Phonebook

In order to avoid the lengthy entry of phone numbers while in the air we encourage you to use the phonebook. With the phonebook button on the right side of the SMS / Inbox you can get to the phonebook. Here you can view, edit and create new entries. Please remember when entering phone number for you contact to always use the internation notation using the plus sign and the country code. For example a German mobile phone number 0172/1234567 must be entered as +491721234567.

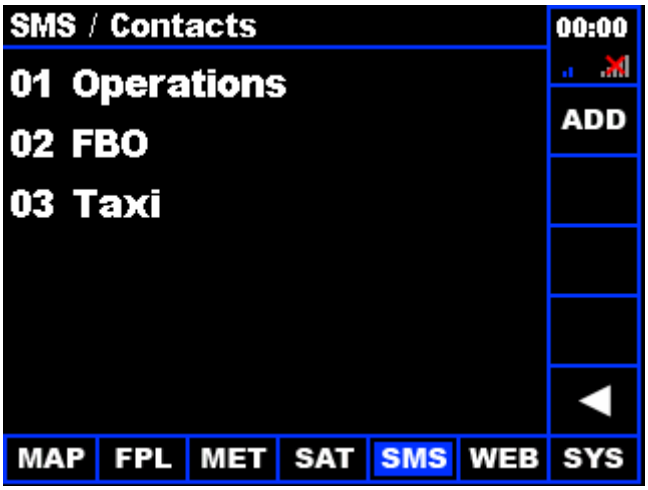

Figure 29 SMS contacts overview / Phonebook

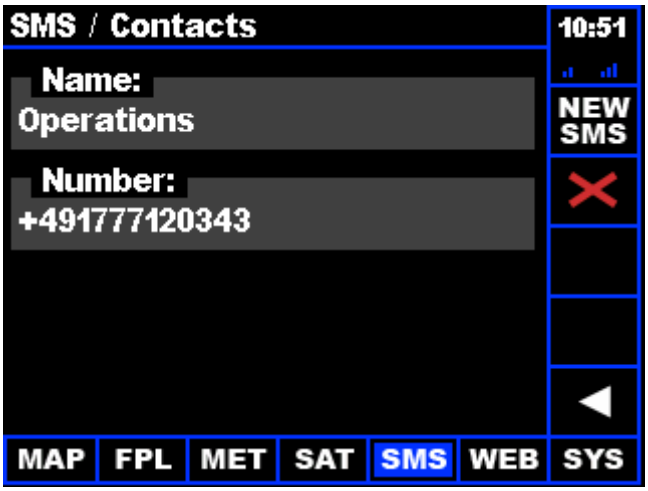

Figure 30 SMS contacts details

14.4 SMS / Compose

There are three ways to compose an new SMS message. First you can use the button “NEW SMS” on the right side of the SMS / Inbox subpage. In this case you will start with an empty form. Second you can use the “NEW SMS” button on any phonebook detail page. This way you start with the phone number of the recipient already filled in. Third you can use the reply button on the SMS / Detail subpage. This will also start up the dialog with the phone number already filled in.
No matter how you started the dialog you will see a screen which allows to enter or modify the phone number and the message text. Touch the corresponding field in order to start the touchscreen keyboard. When finished you can use the “SEND” button on the right side to send the message or the delete button to clear all fields. When using the send button the message will be added to the send buffer and transmitted as soon as possible.

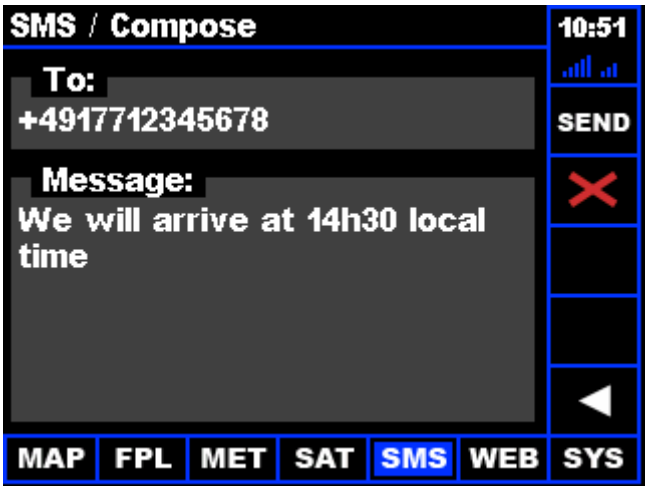

Figure 31 Compose a new SMS

Figure 32 Entering the phone number, always preceeded by a + sign

15 WEB: Weblog / Internet logging

This function is intended for users whishing to publish a message including their current position on their website for family, friends or others wishing to follow their trip. You can make your trip logs either public or protect them with a password.
The log messages are uploaded automatically in real time to a Google Account. Therefore you require a valid Google account which can be obtained free of charge at:

https://accounts.google.com/SignUp

Using the lock symbol on the right side of the WEB page you can open the configuration screen.

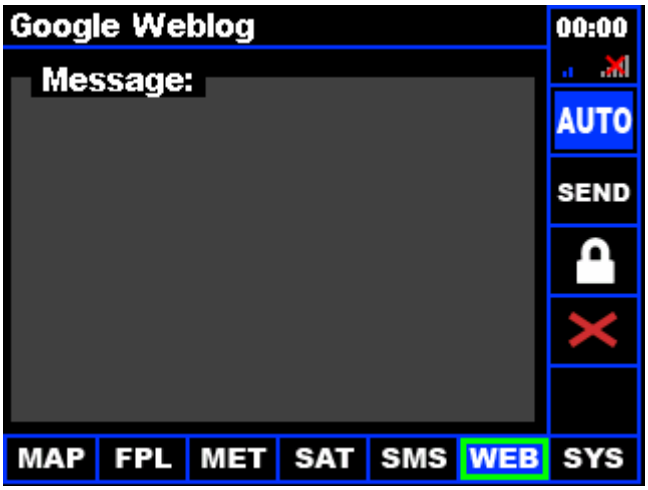

Figure 33 Auto mode activated

On the configuration screen you have to enter your Google username and Password. Besides you have to specify the name of the map on which your messages should be displayed. If the map does not exist in the Google account once the first message is posted it will be created automatically.

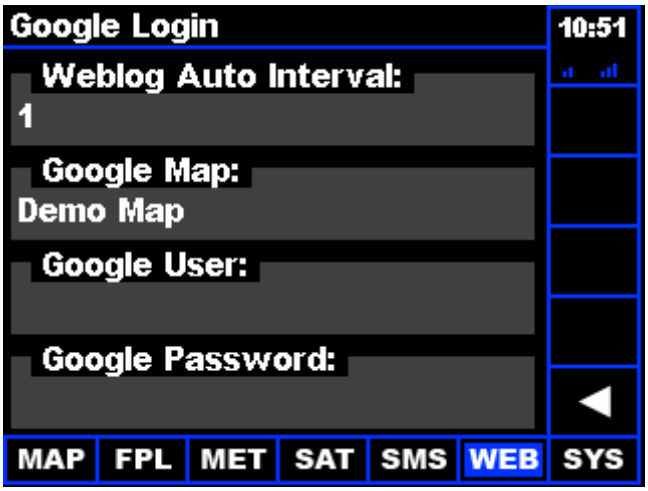

Figure 34 Google Login credentials and auto weblog configuration

Having done the configuration you can type in a message by pressing on the gray text field and entering your message. Return by pressing “OK” on the keyboard page and send the message using the “SEND” button on the right side of the screen. Your message will then be posted on your Google map.

Figure 35 WEB page allowing to enter a new Weblog message

In addition to manual message you can activate the automatic mode by pressing the “Auto” button on the WEB pages. The activity of the auto mode is continuously indicated by the green box around the WEB symbol in the bottom navigation bar. In auto mode the system will post an automatic message at the interval in minutes specified on the WEB config page (see above). In addition when the system detects a takeoof or landing a special message will be posted. When posting manual messages in auto mode or when a takeoff or landing message is posted the timer for the automatic messages is reset. This feature allows to log your for family and friends while producing no addition workload for the pilot.

When using the automatic weblog please take into account that every position message will produce modest satellite transmission costs. Depending on your contract these will be approximately 0,08 EUR / message.

16 SYS: System Data and Configuration

The SYS page displays current technical information including software versions, GPS receiver data etc. Plus und Minus Symbols on the right you can adjust the brightness of the display for night use.

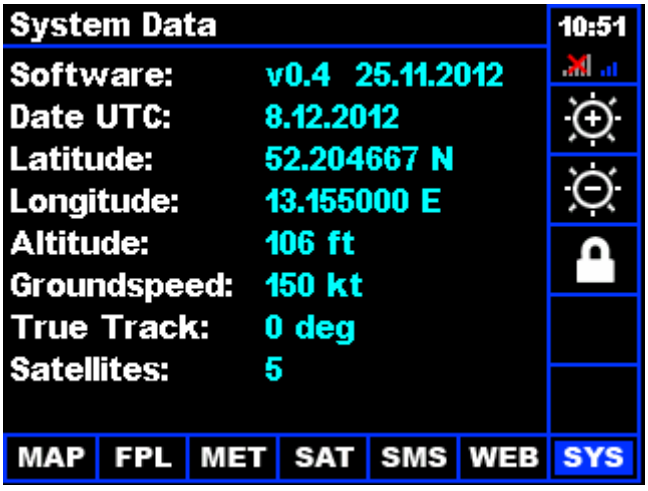

Figure 36 System Data page with display brightness controls on the right side.

16.1 Deutscher Wetterdienst Credentials

Using the lock symbol on the right side of the SYS page you can edit the Deutscher Wetterdienst (DWD) credentials.

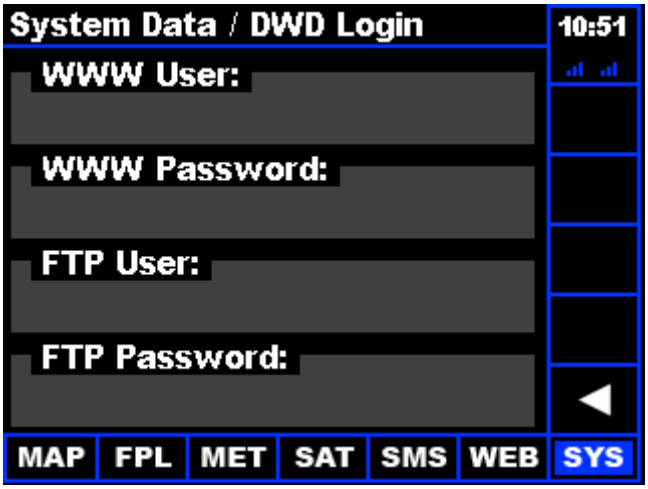

Figure 37 DWD login screen

The required login details can be found on the login letter send to you by DWD. Please not that you will be given two usernames and passwords. One is used for www login. This is the username / password combination you also use for login on http://www.flugwetter.de. The second is the FTP login which is used for programmatic downloads from ftp://ftp.pcmet.de. Figure 38 shows a sample letter from DWD containing the login credentials.
You have to enter both as parts of the desired data (strike maps) are downloaded via the www login while other parts (radar, METAR, TAF) are downloaded via the FTP login.

Deutscher Wetterdienst
Wetter und Klima aus einer Hand

Deutscher Wetterdienst - Postfach 10 04 65 - 63004 Offenbach

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069-8062-2014
UST-ID: DE221793973

Offenbach, 26.09.11

Datenzugang pc_met für Ihre Navigationssoftware
Kundennummer: LFGL0364

Sehr geehrter Herr Dr. Golze,

vielen Dank für Ihre Anfrage.

Sie sind für Ihre Navigationssoftware mit folgenden Zugangskennungen zu den pc_met-Daten freigeschaltet:

Ihr Username:	**Lf0364**
Ihr Passwort:	**xxxxxxx**

Der Server, auf dem die Daten abgelegt sind, heißt: **ftp.pcmet.de**

Ihre Zugangskennungen für das Internet auf der Seite www.flugwetter.de lauten wie bisher:

Internet-Benutzername:	**demo**
Internet-Kennwort:	**xxxxxxx**

Mit freundlichen Grüßen

Ihr pc_met-Team

www.dwd.de
Dienstgebäude: Frankfurter Str. 135 - 63067 Offenbach am Main, Tel. 069 / 8062 - 0
Kontoverbindung: Bundeskasse Trier - Deutsche Bundesbank, Filiale Saarbrücken - Kto-Nr.: 59001020 - BLZ: 590 000 00
Der Deutsche Wetterdienst ist eine teilrechtsfähige Anstalt des öffentlichen Rechts im Geschäftsbereich des Bundesministeriums für Verkehr, Bau und Stadtentwicklung.
Das Qualitätsmanagement des DWD ist zertifiziert nach DIN ISO 9001:2008 (Reg.-Nr. 816/2324 ZER-QMS)

Figure 38 DWD credentials sample

17 Updating the Firmware

The ADL110 device contains a firmware which may be updated by the user or installer. Please contact us or go to our website in order to get the most up to date firmware file. The firmware can either be updated with the device installed in the aircraft or with the detached device.

For updating the ADL devices you will need the following equipment:

- PC running Windows Operating System
- Serial ADL programming cable
- USB – Serial adapter (only if PC is not equipped with a serial port)
- Mains power supply for the ADL110 if not updating in aicraft
- twload32.exe firmware loading software
- Firmware file (*.t2u)

When updating the ADL110 devices take your time. The update process can last approximately 10 minutes.

Please proceed with the update process exactly in the order described. In case of any malfunction restart the procedure from the beginning.

17.1 Installing the USB – serial converter

This installation has to be done only once for every PC you are using to update the firmware.

1. Turn on your Windows PC
2. Insert the USB – serial adapter (Figure 39). Remember the USB port used and reuse this exact USB port when reinserting the converter in order to avoid changes to the COM port number.

Figure 39 USB – serial adapter

3. Follow the Windows driver installation dialog until the USB – serial adapter is installed properly.

4. Look up in the Windows settings dialog the COM port number of the adapter. It will be named “Prolific USB-to-Serial Comm Port” USB (Figure 40)

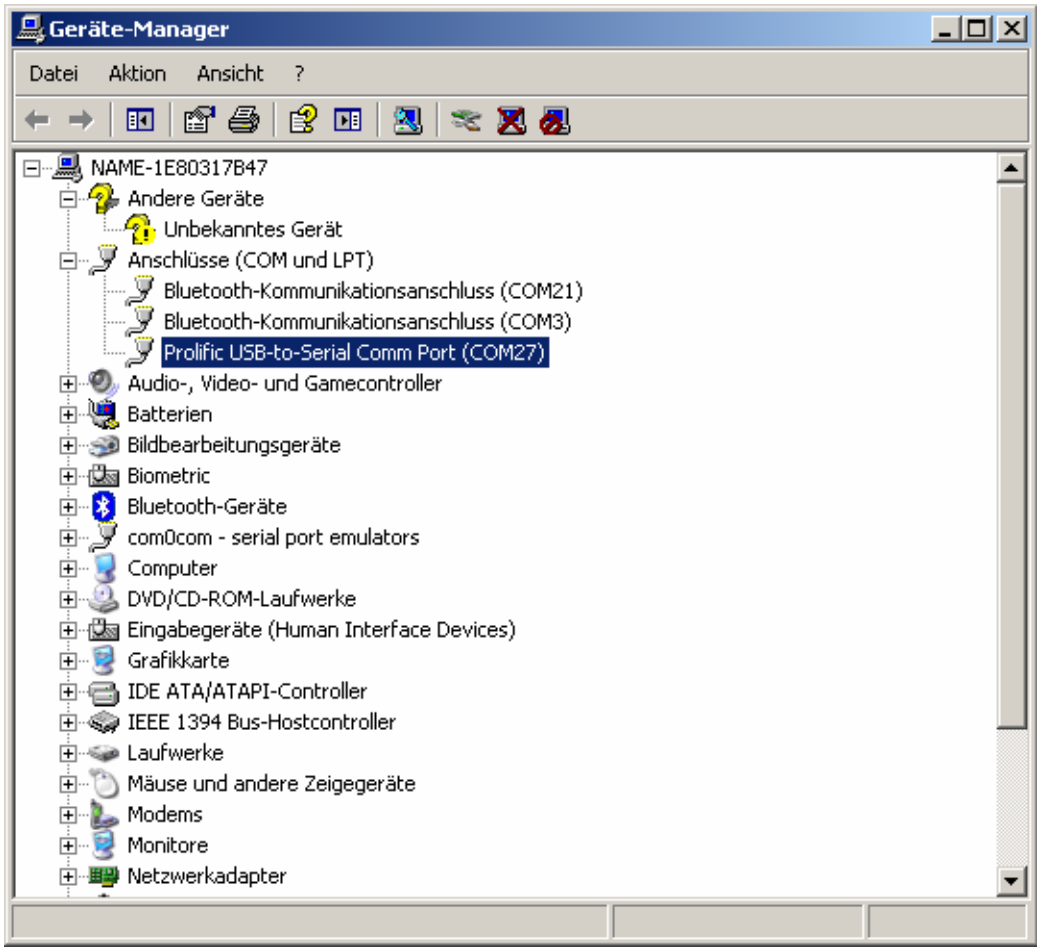

Figure 40 Device manager showing the COM port number COM27

17.2 Connecting the ADL110 programming cable – In the aircraft

Please follow these steps when updating the ADL110 in the aircraft.

1. Turn off all electric equipment in the aircraft. Make sure you have ground power or similar for the duration of the update. Make sure the aircraft is secured.
2. Locate the ADL110 Update connector. Usually it can be found below the instrument panel.
3. Disconnect the ADL110 Plug.
4. Connect the USB - serial ADL110 programming cable to the ADL110 update connector-
5. Power up the ADL110. The Display will show the start screen but the device will remain in the hardware initialization stage. This means it is ready for update.

17.3 Connecting the ADL110 programming cable – Outside the aicraft

1. Connect the USB - serial ADL programming cable to the ADL100 and to the PC

2. After connecting the programming cable, power up the ADL using the mains power supply. The Display will show the start screen but the device will remain in the hardware initialization stage. This means it is ready for update.

17.4 Installing the ADL110 Firmware

1. Start the twload32.exe firmware loading software on your PC
2. Configure the serial port by opening the menu “Options” -> “Communication”. Select your individual COM port number and configure the other options to their defaults as shown in Figure 41 . Please pay special attention that you have configured baudrate “**115200**” and Parity “**None**” . Finally press OK.

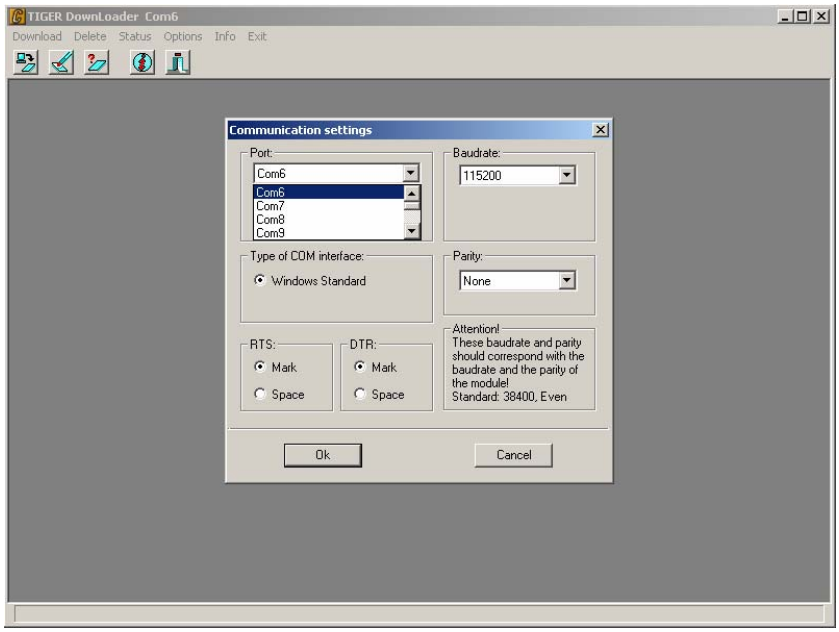

Figure 41 COM port configuration

3. Open the menu “Download” -> “Programm module…” and select the firmware file with the file extension *.t2u
4. Wait until the file is transferred to the ADL device (Figure 42)

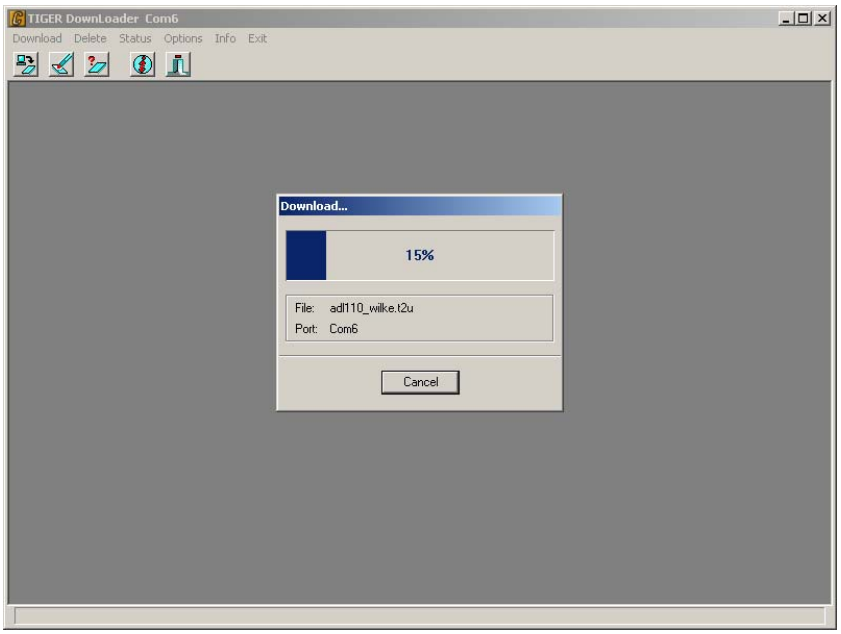

Figure 42 Firmware transfer

5. When the transfer is completed close the twload32.exe application. Please note that in case of success the progress bar dialog will close and no further message will be shown. In case of an error an error message will be displayed.

17.5 Disconnecting the ADL110 programming cable – In the aircraft

1. Switch of the ADL110 using the circuit breaker or the avionics master switch.
2. Disconnect the ADL serial programming cable
3. Important: Reinstall the ADL110 Plug. Failure to reinstall the plug will deactivate flight plan transmission from the GPS.

17.6 Disconnecting the ADL110 programming cable – Outside the aircraft

1. Disconnect the ADL serial programming cable
2. Disconnect and reconnect the mains power supply in order to reboot the device

17.7 Wait until the ADL110 has updated internal data structures

1. Now the ADL device will boot and perform updates to internal data structures. This process will take a few minutes (Figure 43).

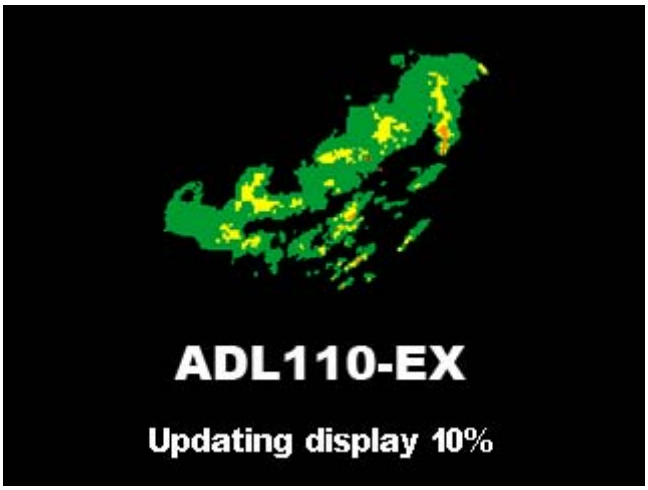

Figure 43 ADL110 Updating internal data structures

2. Once the map page of the user interface is shown the update is completed.
3. Verify the functionality of the ADL110.

18 Contact

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